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REMARKS

The present response is intended to be fully responsive to all points of objection and/or rejection raised by the Examiner and is believed to place the application in condition for allowance. Favorable reconsideration and allowance of the application is respectfully requested.

Applicants assert that the present invention is new, non-obvious and useful. Prompt consideration and allowance of the claims is respectfully requested.

Although there was a discussion with the Examiner on October 15, 2006, in the detailed action section of this third office action, the Examiner refers only to the submission from August 14, 2006 and therefore this reply also ignores the October 15th discussion.

Status of Claims

Claims 1-3, and 5-14 are pending in the application

35 U.S.C. § 112 Rejections

In the office action, the Examiner rejected claims 1-3 and 5-14 as being indefinite because of the relative terms "high" and "low". Applicants respectfully traverse the rejection. Applicants respectfully refer to MPEP 2173.05(b) where it is written that relative terminology does not render a claim indefinite if one of ordinary skill in the art would understand what is claimed, in light of the specification. "When a term of degree is presented in a claim, first a determination is to be made whether the specification provides some standard for measuring that degree. If it does not, a determination is made as to whether one of ordinary skill in the art, in view of the prior art and the status of the art, would be nevertheless reasonably apprised of the

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scope of the invention." Applicants respectfully submit that the current specification clearly provides a standard for measuring the degree, as per the Examiner own quote from the specification: "The terms "high" and "low" should be understood as relative to one another". In fact the entire third paragraph of the Detailed Description (page 5, lines 10-27) of the current application, inter-alia, elaborates on a standard for understanding the terms high and low. Applicants also respectfully submit that from the earlier office actions prepared by the Examiner, for example point 4 in the second office action dated 05/12/2006 and point 8 in the first office action dated 12/29/2005, it is clear that the Examiner apprised the scope of the terms high and low as used in the claims. Therefore Applicants will in the rest of this response address the claims as originally written.

35 U.S.C. § 102 Rejections

In the Office Action, the Examiner rejected claims **1** and **6-14** under 35 U.S.C. § 102(b), as being anticipated by Ohran (US 2004/0034752, hereinafter "Ohran").

Applicants respectfully traverse the rejection of **1** and **6-14** under 35 U.S.C. § 102(b), as being anticipated by Ohran.

Applicants respectfully assert that Ohran does not teach or suggest a method of storage management including storing data on a high reliability high performance storage medium, backing up the data on a high reliability low performance storage medium, and after backing up, copying at least some of the data to a low reliability high performance storage medium, as recited in independent claim 1 of the current application.

In addition, Applicants respectfully assert that Ohran does not teach or suggest a storage system including a high performance high reliability storage medium configured for initial storage of data; a low performance high reliability storage medium configured for backup of data initially stored on the high performance high reliability storage medium; and a high performance low reliability storage medium

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configured to receive at least some of the data after the data has been backed up on the low performance high reliability storage medium, as recited in independent claim 6 of the current application.

Additionally, Applicants respectfully assert that Ohran does not teach or suggest a program storage device tangibly embodying a program of instructions to perform method steps of storage management including: storing data on a high reliability high performance storage medium, backing up the data on a high reliability low performance storage medium, and after backing up, copying at least some of the data to a low reliability high performance storage medium, as recited in independent claim 13 of the current application.

Also, Applicants respectfully assert that Ohran does not teach or suggest a computer program product comprising a computer useable medium having computer readable code embodied therein including code for causing the computer to store data on a high reliability high performance storage medium, to back up the data on a high reliability low performance storage medium, and to copy at least some of the data to a low reliability high performance storage medium after the backing up, as recited in independent claim 14 of the current application.

In each of the independent claims 1, 6, 13, and 14 of the current application, paraphrased above, a storage sequence is recited which includes data first being stored on a high reliability high performance storage medium, the data then being backed up on a high reliability low performance storage medium, and then at least some of the data being stored on a low reliability high performance storage medium. The independent claims 1, 6, 13, and 14 clearly indicate that a storage sequence is being recited.

For example, in claim 1, the words “backing up said data” indicate that the data which was stored on the high reliability high performance storage medium is then stored (i.e. backed up) on the high reliability low performance storage medium. Continuing with the example, in claim 1, the words “after said backing up” indicate

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that the storage of at least some of the data on the low reliability high performance storage medium occurs after the backing up onto the high reliability low performance storage.

As another example, in claim 6 the words “for backup of data initially stored” indicate that the low performance high reliability storage medium is configured to backup data which was first stored on the high performance high reliability storage medium. Continuing with this example, in claim 6, the words “after said data has been backed up” indicate that the high performance low reliability storage medium is configured to receive data after backup has occurred on the low performance high reliability storage medium. Claims 13 and 14 similarly use terms such as “back(ing) up said data and “after said backing up” to clearly recite the storage sequence.

The storage sequence with regard to various storage media differentiated in terms of performance and/or reliability as recited in each of independent claims 1, 6, 13, and 14 of the current application is neither indicated at nor hinted in Ohran as will be shown below.

Ohran describes a method and system for mirroring and archiving mass storage. More details are provided, for example, in the abstract:

A method and system for mirroring and archiving mass storage. A primary mass storage and a secondary mass storage are synchronized to contain the same data. Thereafter, a primary system tracks changes made to the primary mass storage. These changes are consolidated periodically into update files, the consolidations representing changes made to the primary mass storage during a time interval that ends when the primary mass storage is in a logically consistent state. These update files contain only those changes necessary to represent the modified state of the primary mass storage at the time of the update. The primary system then transfers the update files to a secondary system to bring the secondary mass storage current with the primary mass storage. The consolidation minimizes the amount of information that must be transferred and therefore allows for a relatively low band width communication channel. In addition, update files may be cached by the primary system so that requests for mirrored or archived data may be fulfilled by the primary system cache rather than requiring access to the secondary system.

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The described system in Ohran comprises a primary storage, a secondary storage and optionally a cache holding area- see for example Figure 1.

In the discussion in Ohran of the primary storage and the cache holding area there is no differentiation between characteristics of the two memories, and certainly no discussion of any differences in reliability between the primary storage and the cache holding area. For example, the primary storage is described for example on page 5, paragraph 0048, and on page 5, paragraph 49 as follows:

The primary mass storage means can be any storage mechanism that stores data which is to be backed up using the present invention. For example, such mass storage means may comprise one or more magnetic or magneto-optical disk drives.

If the primary mass storage means is a RAM or other word or byte addressable storage device...

Similarly, the cache holding area is described for example on page 5, paragraph 50

As described in greater detail below, such cache holding means may comprise any type of writable storage device such as RAM, EEPROM, magnetic disk storage, and the like. Such cache holding means may also comprise a portion of primary mass storage **20**.

From the above quotes relating to the primary storage and cache holding area, it is clear that for the purposes of the invention of Ohran, the primary storage and cache holding area may have the same characteristics (for example because both may be RAM), and that the cache holding means may even comprise part of the primary storage. Certainly, no differentiation is described between the reliability of the primary storage and the cache holding area.

In addition, for the purposes of the invention of Ohran, the secondary storage has the following meaning as defined for example on page 5 paragraph 47:

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Similarly, the term "secondary" merely identifies the system with attached mass storage means for mirroring and archiving the primary system 12.

In Ohran there is no explicit mention of required characteristics for the secondary storage. For example, for the purposes of Ohran's invention the secondary storage may comprise a storage device identical to the storage device of the primary system (consequently having the same performance and reliability characteristics) – see for example page 5, column 52:

For example, secondary mass storage means may comprise a storage device identical to the mass storage device of a primary system. If the primary system has a large magnetic disk, for example, the secondary mass storage means may also comprise a large magnetic disk. As another example, secondary mass storage means may comprise archival storage devices such as a magnetic tape drive or an optical or magneto-optical drive. The type of storage devices that may be used for secondary mass storage means is limited only by the particular application where they are used. In some situations it may be more desirable to have a secondary mass storage means that more closely resembles the primary mass storage means. In other situations it may be perfectly acceptable to have archival type storage means that are optimized to store large amounts of data at the expense of rapid access. (underline added).

To summarize, in Ohran, the reliability of the various storage media including the primary storage, cache holding area, and secondary storage is not discussed. Certainly there is no indication that Ohran uses a low reliability storage medium at all. In addition, in Ohran, distinctions in performance among the various storage media are unnecessary and irrelevant.

Although as shown above, there is neither a hint nor an indication that the cache holding area of Ohran is a low reliability high performance storage medium, for the sake of completeness, Applicants would like to respectfully address the Examiner's statement in point 7 of the office action. In point 7 of the office action, the Examiner seemingly equates the cache holding area of Ohran to the low reliability high performance storage medium of the current invention.

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Applicant would like to respectfully repeat that in the current invention the storage sequence includes the data first being stored on a high reliability high performance storage medium, the data next being backed up on a high reliability low performance storage medium, and then afterwards at least some of the data being stored on a low reliability high performance storage medium.

In contrast, in Ohran the data is first written to the primary storage- see for example page 8 paragraph 0074:

During normal operation of primary system **12**, data is periodically written to attached primary mass storage **20**

Alternatively in Ohran the data may be written directly to the cache holding area as stated for example in page 9 paragraph 0080:

If cache-holding area **22** is part of primary mass storage **30**, there should be some mechanism for ensuring that tracked changes **60a**, **60b**, **60c**, etc. are preserved only for changes made to that portion of primary mass storage **20** that is not included in cache-holding area **22**,...

Then, in Ohran a copy of the update is placed in the cache holding area. Only after the copy of the update is placed in the cache holding area is the copy transferred to the secondary system. This order of first placing the update copy in the cache holding area and then transferring the update copy to the secondary system is repeated numerous times in Ohran, and no alternative to this order is mentioned. See for example page 9 paragraph 0078, 0082 and 0083

The updates and tracked changes that are stored at cache-holding area **22** and that have not yet been sent to secondary system **14** constitute part of the mirrored data. For example, during the period of time between times T1 and T2, tracked changes **60b** are part of the mirrored data. Moreover, if there is a delay in sending consolidated updates to secondary system **14**, these consolidated updates remain in cache-holding area **22** and are part of the mirrored data. For instance, consolidated update **60a**, if it has not yet been sent to secondary system **14** after time T1, is part of the mirrored data. (underline added).

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Because updates stored in cache holding area **22** are not necessary for mirroring or archiving once they have been sent to the secondary system, the decision of which update to delete is primarily a performance consideration. However, updates that have not yet been sent to secondary system **14**, because of transmission delays or otherwise, are still needed for purposes of mirroring, and should not yet be deleted (underline added)

Other than updates that have not yet been sent to secondary system **14**, the contents of cache holding area **22** are not necessary for mirroring and archiving because secondary mass storage system **24** performs that function (underline added)

From the above quotes from Ohran, it is clear that storage of the update copy in the cache holding area precedes the storage of the update copy in the secondary storage. It is also noted that in Ohran the updates may be deleted from the cache holding area once they have been sent to the secondary system, further emphasizing that in Ohran the storage in cache precedes the storage in the secondary storage. As mentioned above, there is no discussion in Ohran of the reliability characteristics of the various storage media and certainly neither a hint nor an indication that the cache holding area of Ohran is a low reliability high performance storage medium. On the contrary, considering that there may be a delay in sending the updates to the secondary system, it is certainly more feasible to assume that the cache holding area in Ohran is a high reliability storage medium. However even if one would assume that the cache holding area of Ohran can be equated to the low reliability high performance storage medium of the current invention (as the Examiner seemingly equates in point 7 of this office action), the sequence of storage of Ohran does not match the storage sequence recited in the independent claims of the current invention. Recall that in the current invention, the storage in the low reliability high performance storage medium follows the storage in the high reliability low performance storage medium.

Based on the above discussion, Applicants respectfully assert that independent claims **1, 6, 13**, and **14** are allowable over Ohran. Claims **2, 3, 5, 7-12** depend from, directly or indirectly, claims **1, 6, 13**, and **14** and therefore include all the elements of those claims. Therefore, Applicants respectfully assert that claims **2-3, 5, 7-12** are

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likewise allowable. Accordingly, Applicants respectfully request that the Examiner withdraw the rejections to independent claims **1, 6, 13** and **14**, and to claims **2-4, 5, 7-12** dependent thereon.

Applicants believe the remarks presented hereinabove to be fully responsive to all of the grounds of rejection raised by the Examiner. In view of these remarks, Applicants respectfully submit that the specification and all of the claims in the present application are in order for allowance. Notice to this effect is hereby requested.

Please charge any fees associated with this paper to deposit account No. 09-0468.

Respectfully submitted,

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